REMARKS

This application is under final rejection. Applicant has presented amendments that Applicant believes should render the claims allowable. In the event, however, that the Examiner is not persuaded by Applicant's amendments, Applicant respectfully requests that the Examiner enter the amendments to clarify issues upon appeal.

This communication is in response to the Office Action dated December 1, 2005. Claims 1-29 are pending in the present Application. Claims 1, 2, 5-9, 11-16 and 18-29 have been amended for clarification. Claims 1-6, 8-12, 14-19, 21-24 and 26-28 are rejected. Claims 7, 13, 20, 25 and 29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

102 Rejections

Claims 1-6, 8-12, 14-19, 21-24 and 26-28

The Examiner states:

> **Claims 1-6, 8-12, 14-19, 21-24 and 26-28 are rejected under 35 USC §102(e) as being anticipated by Friedrich et al. (US 2003/0193777).**

For ease of review, Applicant reproduces independent claims 1, 8, 14 and 21 herein below:

1. A method for dynamically controlling cooling systems in a data center comprising:

determining a workload within the data center;

determining an amount of heat being generated as a function of the workload; and

activating each of a plurality of different types of cooling systems within the data center in an optimal fashion based on the heat being generated.

8. A system for dynamically controlling cooling systems in a data center comprising:

means for determining a workload within the data center;

means for determining an amount of heat being generated as a function of the workload; and

means for activating each of a plurality of different types of cooling systems coupled within the data center in an optimal fashion based on the amount of heat being generated.

14. A data center comprising:

a global computer system;

a plurality of different cooling systems coupled to the global computer system; and

a cooling system control module coupled to the global computer system and the plurality of different cooling systems wherein the cooling system control module includes logic for:

determining a workload within the global computer system;

determining an amount of heat being generated as a function of the workload; and

activating each of a plurality of different types of cooling systems coupled to the global computer system in an optimal fashion based on the amount of heat being generated.

21. A computer program product for dynamically controlling cooling systems in a global computer system, the computer program product comprising a computer usable medium having computer readable program means for causing a computer to perform the steps of:

determining a workload within the global computer system;

determining an amount of heat being generated as a function of the workload; and

activating each of a plurality of different types of cooling systems coupled to the global computer system in an optimal fashion based on the amount of heat being generated.

26. A cooling system control module for a data center comprising:

determination logic for:

determining a workload within the data center; and

determining an amount of heat being generated as a function of the

workload; and

activation logic for activating each of a plurality of different types of cooling systems within the data center in an optimal fashion based on the amount of heat being generated.

Applicant respectfully disagrees. The present invention includes a method and system for dynamically controlling cooling systems in a data center. The present invention dynamically controls a plurality of different types of cooling systems within a data center based on the workload constraints (power consumed, latency, etc.) of the data center. Accordingly, each of the plurality of different types of cooling systems is activated in an optimal fashion based on the workload constraints. As a result of the use of the method and system in accordance with embodiments of the present invention, a substantial savings in operational costs related to cooling systems is achieved.

Claim 1 recites a method for dynamically controlling cooling systems in a data center that includes determining a workload within the data center, determining an amount of heat being generated as a function of the workload and ***activating each of a plurality of different types of cooling systems*** within the data center in an optimal fashion based on the heat being generated. (Emphasis added.)

The Examiner states that the Friedrich reference anticipates the present invention. Applicant respectfully disagrees and asserts that the Friedrich reference does not disclose ***activating each of a plurality of different types of cooling systems within the data center in an optimal fashion*** based on the heat being generated as recited in claim 1 of the present invention. Friedrich discloses

an energy management system for one or more computer data centers, including a plurality of racks containing electronic packages. The electronic packages may be one or a combination of components such as, processors, micro-controllers, high-speed video cards, memories, semi-conductor devices, computers and the like. The energy management system includes a system controller for distributing workload among the electronic packages. The system controller is also configured to manipulate cooling systems within the one or more data centers.

In response to the Applicant's argument filed on September 13, 2005, Examiner states that the Applicant's arguments with respect to claims 1-4, 6, 8-10, 21-24 and 26-28 have been considered but they are not persuasive. Applicant argued that paragraph 21 did teach a variety of different types of cooling elements. However, Applicant asserted that these "cooling elements" make up a single "cooling resource".

Applicant asserts that the independent claims have been amended for clarification to change the term "resources" to "systems". Applicant asserts that the aforementioned amendment magnifies the notion that the invention focuses on the activation of different cooling ***systems*** in optimal fashion. The Friedrich reference only relates to the activation of a single cooling system (fluid-based air-conditioning system). ***Friedrich does not teach or suggest the step of activating each of a plurality of different types of cooling systems within the data center in an optimal fashion based on the heat being generated.*** Paragraph 21 of Friedrich reads:

> As outlined above, the system controller 130, illustrated in FIG. 1A, controls the operation of the cooling system 115 and the distribution of work among the plurality of computer racks 110. The system controller 130 may include a memory (not shown) configured to provide storage of a computer software that provides the functionality for distributing the work load among the computer racks 110 and also for controlling the operation of the cooling arrangement 115, including the cooling vents 120, the fan 121, the cooling coil 122, the compressor 123, the condenser 124, and various other air-conditioning elements. The memory (not shown) may be implemented as volatile memory, non-volatile memory, or any combination thereof, such as dynamic random access memory (DRAM), EPROM, flash memory, and the like. It should be noted that a data room arrangement is further described in co-pending application: "Data Center Cooling System", Ser. No. 09/139,843, assigned to the same assignee as the present application, the disclosure of which is hereby incorporated by reference in its entirety.

Although Freidrich discloses a variety of different cooling elements, these elements make up a single fluid-based cooling system. This is evidenced in paragraph 26 of Freidrich which reads:

> ...the optimizing calculations may be based on a constant workload distribution and a variable cooling arrangement. For example, the calculations may involve permutations of possible workload-to-cooling arrangements that have a fixed workload distribution among the electronic packages 112a-112p, but a variable cooling arrangement. Varying the cooling arrangement may involve varying the distribution of cooling fluids among the vents 120a-120p, varying the rate at which the cooling fluids are distributed, and varying the temperature of the cooling fluids.

As can be seen Friedrich varies the cooling arrangement by varying the rate at which the cooling fluids are distributed and varying the temperature of the cooling fluids. Applicant again asserts that Freidrich does not teach the step of activating each of a plurality of different types of cooling *systems* within the data

center in an optimal fashion based on the heat being generated as recited in the present invention. The cooling system of the present invention includes a plurality of different types of cooling systems. For example, in an embodiment of the present invention, a first type of cooling system is an air-based cooling system, a second type of cooling system is a liquid-based cooling system and a third type of cooling system is a gas-based cooling system. ***The Friedrich reference does not disclose the implementation of a plurality of different cooling systems as recited in the independent claims of the present invention. Freidrich only discloses the implementation of a single, liquid based cooling system.***

Furthermore, as stated in the previous response, claim 2 recites an embodiment whereby the optimal fashion is based on a cost associated with the activation of each of the plurality of different cooling systems. ***Friedrich does not teach or suggest an optimal fashion based on a cost associated with the activation of each of the plurality of different cooling systems.***. The Examiner stipulates that Friedrich teaches this step in paragraph 33. Paragraph 33 reads:

> After determining the energy utilization of the servers 112a, 112e, 112h and 112m, the system controller 130 may determine an optimal workload-to-cooling arrangement. The optimal workload-to-cooling arrangement may be one in which energy utilization is minimized, or one in which energy cost are minimized. In this example, the energy utilization is to be minimized, therefore the system controller 130 performs calculations to determine the most energy efficient workload-to-cooling arrangement

Although Friedrich discloses cooling optimization to minimize energy utilization or to minimize energy costs, Applicant fails to see how this paragraph demonstrates that an optimal fashion of activating each of a plurality of different

cooling systems is based on a cost associated with the activation of each of the plurality of different cooling systems.

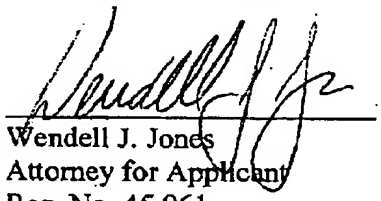
Consequently, since the Friedrich reference merely discloses varying the rate at which the cooling fluids are distributed and varying the temperature of the cooling fluids of a single fluid-based cooling system, Friedrich does not disclose the step of activating each of a plurality of different types of cooling systems within the data center in an optimal fashion based on the heat being generated as recited in the independent claims of the present invention. Accordingly, independent claims 1, 8, 14, 21 and 26 of the present invention are allowable over the Friedrich reference.

Claims 2-6, 9-12, 15-19, 22-24 and 27-28

Since claims 2-6, 9-12, 15-19, 22-24 and 27-28 are respectively dependent on claims 1, 8, 14, 21 and 26, the above-articulated arguments with regard to independent claims 1, 8, 14, 21 and 26 apply with equal force to claims 2-4, 6, 9-10, 22-24 and 27-28. Accordingly, claims 2-4, 6, 9-10, 22-24 and 27-28 should be allowed over the Examiner's cited reference.

Applicant believes that this application is in condition for allowance. Accordingly, Applicant respectfully requests reconsideration, allowance and passage to issue of the claims as now presented. Should any unresolved issues remain, Examiner is invited to call Applicant's attorney at the telephone number indicated below.

Respectfully submitted,



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